

We claim:

1. A system for deriving a 3D model of a face from a 2D image captured with an image sensor, comprising:

a computing device executing software for performing the functions of:

- (a) placing a plurality of fiducial points at landmarks on said face, each of said fiducial points corresponding to a fiducial point for a mean face calculated over a database set of faces;
- (b) calculating a function which captures the deviation of each fiducial point from said mean fiducial point;
- (c) using a thin-plate spline function to create a test face by minimizing a function which provides a measure of the smoothness of the function calculated in step (b);
- (d) selecting a set of uniformly-distributed points on said mean face; and
- (e) finding a set of points on said test face corresponding to said uniformly-distributed set of points on said mean face; and
- (f) for each point in said set of points on said test face, calculating a depth coordinate.

2. The system of claim 1 wherein said depth coordinates are calculated using a linear data completion algorithm.

3. The system of claim 2 wherein said linear data completion algorithm is selected from a group consisting of WGHA and WK-SVD.

4. The system of claim 1 wherein said software further performs the function of providing a textural value for each point in said set of points on said test face.

5. The system of claim 4 wherein said textural value is a grayscale value.

6. The system of claim 1 wherein said software further performs the function of calculating an observational confidence value for each point in said set of points on said test face.

7. The system of claim 6 wherein said observational confidence values are calculated using a generic depth model.

8. The system of claim 6 wherein said observational confidence values are calculated as a function of a camera projection model and a 3D rotation estimate.

9. The system of claim 8 wherein said 3D rotation estimate is calculated along the pitch and yaw axes.

10. The system of claim 1 wherein said landmarks on said face are at predefined locations and further wherein there are 79 fiducial points.

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